The default values for Vehicle Operation Costs (VOC) are based on estimates from the AASHTO "Red Book" (30) and a recent NCDOT Benefit Cost Report (32). They take into account the average fuel consumption of vehicles per minute of delay. If multiplied by the price of gas, this gives an estimate of the dollar cost of being delayed in traffic. The AASHTO "Red Book" then expresses the cost of fuel as a percentage of VOC. In other words, VOC can be estimated by dividing the cost of fuel by the percentage fuel cost of VOC.

Exhibit 26 gives guidance for how the VOC default values for a free-flow speed of 65mph were estimated, and how the analyst can estimate parameters for other facilities. The table uses an estimate of fuel consumption per minute of delay from the literature (30), which is multiplied by 60 to get fuel consumption (in gallons) per hour of delay. That estimate is then multiplied by the assumed cost of fuel, and divided by the parameter for fuel cost as percent of VOC from (36). The resulting estimates in Exhibit 26 should be treated with care, as several assumptions tend to change quickly, due to changing economic conditions.

Exhibit 26: VOC Estimation Guidance (adapted from (30) and (31))

Free-Flow Speed	Fuel Consumption per Minute of Delay (34)		Fuel Consumption per Hour of Delay (gal)		Estimated VOC per Hour of Delay ($)	
	Car	Truck	Car	Truck	Car	Truck
20	0.022	0.102	1.32	6.12	$ 7.62	$ 35.31
25	0.026	0.133	1.56	7.98	$ 9.00	$ 46.04
30	0.03	0.167	1.8	10.02	$ 10.38	$ 57.81
35	0.034	0.203	2.04	12.18	$ 11.77	$ 70.27
40	0.038	0.241	2.28	14.46	$ 13.15	$ 83.42
45	0.043	0.28	2.58	16.8	$ 14.88	$ 96.92
50	0.048	0.321	2.88	19.26	$ 16.62	$ 111.12
55	0.054	0.362	3.24	21.72	$ 18.69	$ 125.31
60	0.06	0.404	3.6	24.24	$ 20.77	$ 139.85
65	**0.066**	**0.447**	**3.96**	**26.82**	**$ 22.85**	**$ 154.73**
70	0.073	0.49	4.38	29.4	$ 25.27	$ 169.62
75	0.08	0.534	4.8	32.04	$ 27.69	$ 184.85

Assumed Cost of Fuel ($/gal)	
Gas	$ 3.00
Diesel	$ 3.00

Fuel Cost as % of VOC
52%

FREEVAL-WZ uses the VOC for a free-flow speed of 65mph as a default input value, but other factors can readily be entered in the software. All inputs can be customized as necessary and should be changed in the future, as hourly wages, gas prices, and the value of goods increase.